

We claim:

1. A method of making a polymer electrolyte membrane comprising the steps of:
 - a) providing a mixture of a polymer comprising a fluorinated backbone and first pendant groups, wherein said first pendant groups comprise groups selected from sulfonyl halide and sulfonate groups, and a bisamidine compound;
 - b) forming said mixture into a membrane; and
 - c) reacting the amidine groups of said bisamidine compound to form triazine groups.

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2. The method according to claim 1 additionally comprising, after step c), the step of:
 - d) converting said groups selected from sulfonyl halide and sulfonate groups to sulfonic acid groups.

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3. The method according to claim 1 wherein said first pendant groups are according to the formula: $-R^1-SO_2X$, where X is $-O^-A^+$, where A^+ is an organic or inorganic cation, and where R^1 is a branched or unbranched perfluoroalkyl or perfluoroether group comprising 1-15 carbon atoms and 0-4 oxygen atoms.

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4. The method according to claim 3 wherein A^+ is ammonium ion.

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5. The method according to claim 1 wherein said first pendant groups are according to the formula: $-R^1-SO_2X$, where X is a halogen and where R^1 is a branched or unbranched perfluoroalkyl or perfluoroether group comprising 1-15 carbon atoms and 0-4 oxygen atoms.

6. The method according to claim 5 wherein X is F.

7. The method according to claim 1 wherein said first pendant groups are according to the formula: -O-CF₂-CF₂-CF₂-CF₂-SO₂F.

8. The method according to claim 1 wherein said first pendant groups are
5 according to the formula: -O-CF₂-CF(CF₃)-O-CF₂-CF₂-SO₂F.

9. The method according to claim 1 wherein said bisamidine compounds are selected from compounds according to the formula:



10 where R¹¹ is a divalent, branched or unbranched, partially or fully fluorinated, alkyl or ether group comprising 1-15 carbon atoms and 0-4 oxygen atoms.

10. The method according to claim 1 wherein said bisamidine compounds are selected from compounds according to the formula:



where R¹¹ is a divalent, perfluorinated alkyl group comprising 2-8 carbon atoms.

11. The method according to claim 1 wherein said bisamidine compounds are according to the formula: H₂N(HN=)C-C₄F₈-C(=NH)NH₂.

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12. The method according to claim 3 wherein said bisamidine compounds are selected from compounds according to the formula:



25 where R¹¹ is a divalent, branched or unbranched, partially or fully fluorinated, alkyl or ether group comprising 1-15 carbon atoms and 0-4 oxygen atoms.

13. The method according to claim 3 wherein said bisamidine compounds are selected from compounds according to the formula:



where R¹¹ is a divalent, perfluorinated alkyl group comprising 2-8 carbon atoms.

14. The method according to claim 3 wherein said bisamidine compounds are according to the formula: H₂N(HN=)C-C₄F₈-C(=NH)NH₂.

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15. The method according to claim 5 wherein said bisamidine compounds are selected from compounds according to the formula:



where R¹¹ is a divalent, branched or unbranched, partially or fully fluorinated, alkyl or

10 ether group comprising 1-15 carbon atoms and 0-4 oxygen atoms.

16. The method according to claim 5 wherein said bisamidine compounds are selected from compounds according to the formula:



15 where R¹¹ is a divalent, perfluorinated alkyl group comprising 2-8 carbon atoms.

17. The method according to claim 5 wherein said bisamidine compounds are according to the formula: H₂N(HN=)C-C₄F₈-C(=NH)NH₂.

20 18. The method according to claim 1 wherein step b) comprises imbibing said mixture into a porous supporting matrix.

19. The method according to claim 18 wherein said porous supporting matrix is a porous polytetrafluoroethylene web.

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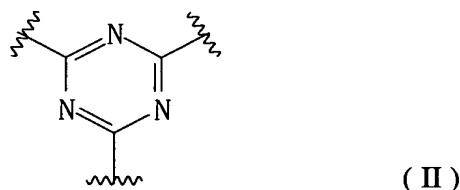
20. A polymer electrolyte membrane made according to the method of claim 1.

21. A polymer electrolyte membrane made according to the method of claim 2.

30 22. A polymer electrolyte membrane made according to the method of claim 3.

23. A polymer electrolyte membrane made according to the method of claim 4.
24. A polymer electrolyte membrane made according to the method of claim 5.
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25. A polymer electrolyte membrane made according to the method of claim 6.
26. A polymer electrolyte membrane made according to the method of claim 7.
- 10 27. A polymer electrolyte membrane made according to the method of claim 8.
28. A polymer electrolyte membrane made according to the method of claim 9.
29. A polymer electrolyte membrane made according to the method of claim 10.
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30. A polymer electrolyte membrane made according to the method of claim 11.
31. A polymer electrolyte membrane made according to the method of claim 12.
- 20 32. A polymer electrolyte membrane made according to the method of claim 13.
33. A polymer electrolyte membrane made according to the method of claim 14.
34. A polymer electrolyte membrane made according to the method of claim 15.
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35. A polymer electrolyte membrane made according to the method of claim 16.
36. A polymer electrolyte membrane made according to the method of claim 17.
- 30 37. A polymer electrolyte membrane made according to the method of claim 18.

38. A polymer electrolyte membrane made according to the method of claim 19.
39. A polymer electrolyte membrane comprising an intimate mixture of:
5 a) a first polymer comprising a fluorinated backbone and first pendant groups
which comprise sulfonic acid groups; and
b) a second polymer which is a fluorinated polytriazine.
40. The polymer electrolyte membrane according to claim 39 wherein said first
pendant groups are according to the formula: $-R^1-SO_3H$, where R^1 is a branched or
10 unbranched perfluoroalkyl or perfluoroether group comprising 1-15 carbon atoms and
0-4 oxygen atoms.
41. The polymer electrolyte membrane according to claim 39 wherein said first
pendant groups are according to the formula: $-O-CF_2-CF_2-CF_2-CF_2-SO_3H$.
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42. The polymer electrolyte membrane according to claim 39 wherein said first
pendant groups are according to the formula: $-O-CF_2-CF(CF_3)-O-CF_2-CF_2-SO_3H$.
43. The polymer electrolyte membrane according to claim 39 wherein said second
20 polymer comprises trivalent groups according to the formula:



said trivalent groups being linked by divalent groups $-R^{11}-$, where R^{11} is a branched or
unbranched, partially or fully fluorinated, alkyl or ether group comprising 1-15 carbon
atoms and 0-4 oxygen atoms.

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44. The polymer electrolyte membrane according to claim 43 where R^{11} is a
perfluorinated alkyl group comprising 2-8 carbon atoms.

45. The polymer electrolyte membrane according to claim 43 where R¹¹ is -C₄F₈-.

46. The polymer electrolyte membrane according to claim 39 wherein said intimate mixture is embedded in a porous supporting matrix.

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47. The polymer electrolyte membrane according to claim 46 wherein said porous supporting matrix is a porous polytetrafluoroethylene web.